This listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

What is claimed is:

1. (Currently amended) An energy efficient pump apparatus, comprising:

a first closed conduit having a first and a second end[[s]];

a first movable piston with a closed end having an effective length A greater than [[the]]a median radius of said closed conduit, said first piston loosely disposed within said first closed conduit such that a gap having a predefined median size is formed between said first piston and said first closed conduit;

wherein said first piston is movable in said closed conduit at a velocity relative to said closed conduit such that as said first piston moves along said closed conduit said first piston creates a substantially tortuous leak path forming a hydrodynamic seal between said first piston and said closed conduit thereby enabling said first piston to displace fluid along said closed conduit; and[[;]]

~~wherein the~~ an efficiency of said hydrodynamic seal is based on said predefined median size of said gap, said effective length A of said first piston, and said velocity of said piston.

2. (Currently amended) [[A]]The pump apparatus [[as in]] of claim 1 wherein said first piston further includes a one-way valve disposed therein~~; wherein~~, and the first piston and the closed conduit are arranged such that when said first piston is moved back and forth along said closed conduit, said piston pulls and pumps fluid along said closed conduit.

3. (Currently amended) [[A]]The pump apparatus [[as in]]of claim 2 wherein said closed conduit is positioned at an angle other than horizontal and said closed conduit further includes a one-way inlet valve at a lower portion thereof~~; wherein~~, and the first piston and the closed conduit are

arranged such that when said first piston is moved up and down along said closed conduit, fluid is pulled into and pumped up said first closed conduit.

4. (Currently amended) [[A]]The pump apparatus [[as in]]of claim 3 further comprising a drive member connected to a top end of said first piston and operable to move said first piston up and down along said closed conduit.

5. (Currently amended) [[A]]The pump apparatus [[as in]]of claim 4 wherein said drive member is flexible.

6. (Currently amended) [[A]]The pump apparatus [[as in]]of claim 5 further comprising a pipe having a top end and a~~second~~ bottom end[[s;]], wherein said ~~second~~ bottom end of said pipe is attached to said top end of said first closed conduit~~; wherein,~~ during [[the]]an up-stroke of said pump apparatus, said first piston is pulled up by said drive member, and during [[the]]a down-stroke of said pump apparatus, said first piston is pulled down by gravity, thereby pulling and pumping fluid into and up said pipe.

7. (Currently amended) [[A]] The pump apparatus [[as in]]of claim 6 further comprising:

a second closed conduit having a top and ~~second~~ a bottom end[[s]], and including an outlet disposed at a lower end of the second closed conduit; and

a second movable piston loosely disposed within said second closed conduit such that a gap having a predefined median size is formed between said second piston and said second closed conduit[[;]], said second piston ~~having~~including a rigid drive member ~~connected thereto~~;

wherein said ~~second~~ bottom end of said second closed conduit is attached to said ~~first~~ top end of said pipe;

~~an outlet at the lower end of said second closed conduit;~~

~~wherein~~ during operation of said pump apparatus said first and second pistons move in said respective closed conduits to facilitate fluid flow into said first closed conduit, into and up said pipe on the up-stroke, and out of said outlet under pressure on the down-stroke.

8. (Currently amendedl) [[A]] The pump apparatus [[as in]]of claim 7 further comprising an outlet pipe connected to the outlet at the lower end of said second closed conduit and a one-way outlet valve disposed in said outlet pipe to limit the amount of force required to move said first and second pistons on the up-stroke.

9. (Currently amended) [[A]]The pump apparatus [[as in]]of claim 7 further comprising:

a closed sleeve outlet conduit comprising a closed sleeve and an outlet pipe connected to an upper portion of said closed sleeve[[;]], said closed sleeve outlet conduit covering said second conduit and creating a ~~sleeve-conduit~~ second gap between [[the]]an outer wall[[s]] of said second conduit and [[the]]an inner wall[[s]] of said closed sleeve, such that said ~~sleeve-conduit~~ second gap is sealed both at [[the]]a bottom and [[the]]a top of said closed sleeve outlet conduit, and such that any fluid flowing through said outlet at the lower end of said second closed conduit flows into said ~~sleeve-conduit~~ second gap[[;]]

wherein during operation of said pump apparatus said first and second pistons move in said respective closed conduits to facilitate fluid flow into said first closed conduit, into and up said pipe and into said second closed conduit during the up-stroke, and ~~though~~ through said opening of said second closed conduit, into said sleeve-conduit gap and out of said outlet pipe under pressure during the down-stroke.

10. (Currently amended) [[A]]The pump apparatus ~~as in~~ of claim 9 wherein said sleeve outlet pipe includes a one-way valve disposed therein to limit the amount of force required to move said first and second pistons on the up stroke.

11. (Currently amended) An energy efficient pump apparatus to pressurize, displace and pump a volume of fluid, the pump apparatus comprising:

a closed conduit; and

a piston assembly comprising:

a top piston having a length-wise dimension greater than that of a washer[[;]],

a bottom piston having a length-wise dimension greater than that of a washer, and a flexible drive member connecting said top and bottom pistons[[;]],

wherein said piston assembly is loosely disposed within said closed conduit such that a gap having a predefined size is formed between said pistons and said closed conduit[[;]], said piston assembly is movable in said closed conduit such that as said top and bottom pistons move, said top and bottom pistons create a substantially tortuous leak path forming a hydrodynamic seal between said top and bottom pistons and said closed conduit thereby enabling said piston assembly to displace said fluid[[;]]~~wherein the~~ and an efficiency of said hydrodynamic seal is based on said predefined size of said gap and said length-wise dimensions of said top and bottom pistons.

12. (Currently amended) [[[A]]The pump apparatus [[as in]]of claim 11 wherein said closed conduit [[is]]comprises a cylinder having an upper portion.

13. (Currently amended) [[A]]The pump apparatus [[as in]]of claim 12 further comprising an outlet connected to a top region of said upper cylinder portion and a one-way outlet valve disposed in said outlet for removal of said displaced fluid.

14. (Currently amended) [[A]]The pump apparatus [[as in]]of claim 13 wherein said outlet [[is]]comprises a sleeve outlet pipe.

15. (Currently amended) [[A]]The pump apparatus [[as in]]of claim 11 wherein said bottom piston includes a one-way inlet valve for fluid upflow during up stroke operation of said apparatus.

16. (Currently amended) [[A]]The pump apparatus [[as in]]of claim 11 wherein said flexible drive member provides a gravitational return stroke during operation of said apparatus.

17. (Currently amended) [[A]]The pump apparatus [[as in]]of claim 11 wherein said flexible drive member [[is]]comprises at least one of a cable, rope, chain, wire or a combination of the foregoing.

18. (Currently amended)An energy efficient pump apparatus to pressurize, displace and pump a volume of fluid, the pump comprising:

a frame;

a cylinder and a pipe assembly mounted on said frame at an angle other than horizontal and comprising:

~~a pipe,~~

a top cylinder having an outlet connected to an upper region of said top cylinder and a one-way outlet valve disposed in said outlet for removal of said displaced fluid,

[[and]] a bottom cylinder having a bottom check valve, and

a pipe connect[[ed]]ing [[to]] said top cylinder to ~~by said pipe;~~ said bottom cylinder ~~having a bottom check valve~~;

~~said top cylinder having an outlet connected to an upper region of said top cylinder and a one-way outlet valve disposed in said outlet for removal of said displaced fluid ;~~

a piston assembly having:

a valve-less top piston having a length-wise dimension greater than that of a washer with a closed end,

a hollow bottom piston having a length-wise dimension greater than that of [[a]]the washer, and ~~further having~~

a one-way fluid inlet valve that allows fluid to flow upwards therethrough during up stroke operation of said apparatus;

a flexible tension member connecting said top and bottom pistons at a distance such that when said piston assembly is disposed within the said cylinder and pipe assembly, said top piston is inside said top cylinder and said bottom piston is inside said bottom cylinder;

wherein said piston assembly is loosely disposed within said cylinder and pipe assembly and form[[ing]]s a gap having a predefined size between said pistons and said cylinders;

said piston assembly is movable in said cylinder and pipe assembly such that as said piston assembly moves said top and bottom pistons create a substantially tortuous leak path forming a hydrodynamic seal between said pistons and said cylinder thereby enabling said top and bottom pistons to pressurize and displace said volume of fluid; and

~~wherein the~~an efficiency of said hydrodynamic seal is based on said predefined size of said gap and said lengths of said top and bottom pistons.

19. (Currently amended) [[A]]The pump apparatus [[as in]]of claim 18 [[to]] wherein said pipe is selected from the group consisting essentially of a rigid pipe [[or]] and a flexible pipe.

20. (Currently amended) [[A]]The pump apparatus [[as in]]of claim 18 wherein said outlet [[is]]comprises a sleeve outlet pipe.

Claims 21.–31. (Cancelled)